LINKING RESEARCH & OPERATIONS TO IMPROVE WEATHER FORECASTS FOR THE NATION

What's *news* at NOAA Testbeds

Welcome to the Winter 2011 edition of *Testbed News*. The weather has certainly kept things interesting across so many of our regions this past season –from winter tornados, to convective blizzards, lake effect storms to flooding. In turn, the testbeds have been busy preparing, deploying, and developing forecasts to better predict atmospheric rivers, springtime severe storms, lake effect snows, hurricanes, and much more!

In this edition of the newsletter, you'll read about a Winter Storms experiment, results from the severe weather testbed experiment, several examples of R2O, and new media solutions some testbeds are using to share information.

Finally, we'd like to announce the upcoming **3rd NOAA Testbed Workshop, 24-26 May in Boulder, Colorado**. We're working on some new ideas for this workshop while keeping some of what we've come to enjoy about this gathering. You will receive additional information in March to help you make plans for attending. We hope you enjoy this edition of *Testbed News* and look forward to seeing you at the Workshop at Boulder in Spring –snow, wind, rain, and sunshine expected.

In this Issue...

NOAA Winter Storms & Pacific Atmospheric Rivers (WISPAR) Experiment

NOAA is leading the Winter Storms and Pacific Atmospheric Rivers (WISPAR) 2011 experiment using the NASA Global Hawk unmanned aircraft 4-11 March 2011. The experiment will consist of up to 3 flights over the north Pacific Ocean to study atmospheric river events and collect targeted observations to improve the forecasting of winter storms. Instruments deployed included a new NCAR/NOAA dropsonde system and the NASA High-Altitude MMIC Sounding Radiometer (HAMSR). The experiment is supported by the NOAA UAS project in part to demonstrate and evaluate the unique capabilities of unmanned aircraft for meeting NOAA's operational and research requirements. Coordination of the experiment is being led by Gary Wick of NOAA/ESRL Physical Sciences Division with help from Michael Black of the NOAA/AOML Hurricane Research Division.

The Global Hawk unmanned aircraft is capable of flying for up to 28 hours at altitudes from 60,000 – 65,000 ft. The NCAR Earth Observing Laboratory (EOL) and NOAA recently partnered in the development of a first-of-its-kind dropsonde system for the Global Hawk capable of deploying up to 89 sondes measuring vertical profiles of air temperature, pressure, humidity, and wind speed. Performance of the system was recently demonstrated during

cont. on page 2

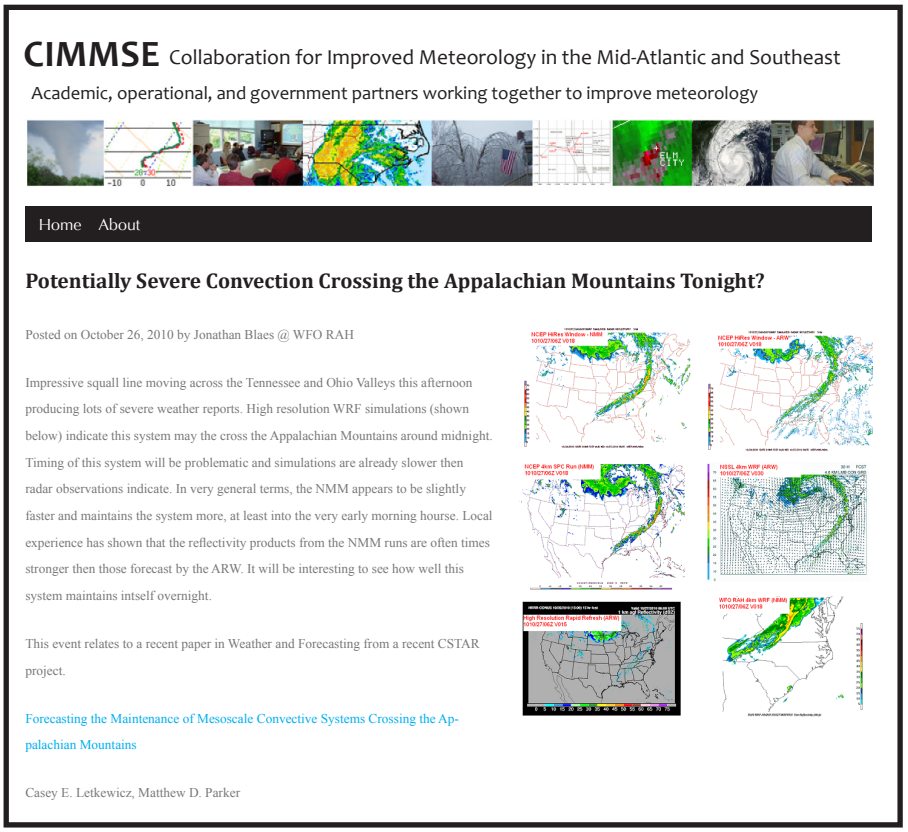
WISPAR experiment cont. from page 1

testing at the NASA Dryden Flight Research Center in California in late January and early February. The long endurance of the Global Hawk aircraft coupled with the capability of deploying many sondes will enable unprecedented research into atmospheric river events and the forecasting of winter storms. Research led by ESRL PSD has shown that atmospheric rivers were present and a major contributor to recent flooding events along the west coast as well as beneficial increases in snowpack. Measurements will document conditions along the complete extent of an atmospheric river and its evolution as it approaches landfall. The operational Winter Storms Reconnaissance program led by NCEP uses the NOAA G-IV aircraft to observe regions found to have the greatest sensitivity in forecasts of severe weather. The Global Hawk will enable studying the impact of collecting measurements over a much wider extent of the sensitive regions than currently possible with manned aircraft. The experiment will further serve as a demonstration of capabilities applicable to future studies of the life cycle of tropical storms.

CSTAR Updates

Improving Prediction of Severe Winds, Convection and Heavy Precipitation in the Southeastern United States

In August 2010, Raleigh Science Officer Jonathan Blaes, with NC State graduate students Briana Gordon and Bryce Tyner, set up a blog to facilitate collaboration between the different collaborative NWS offices and centers, university researchers, and RENCI. The blog contains information on a variety of collaboration activities in the region. The purpose of this blog is to share applied research findings and training materials on forecast topics important to the Southeastern and Mid-Atlantic regions of the country. The blog was designed as a method of conveying up to date research findings not only to members of the CIMMSE Group, but also to the general public. There is an option to register to receive email messages when updates are posted. See http://cimmse.wordpress.com/. A sample entry from the blog is shown at right.



CIMMSE Collaboration for Improved Meteorology in the Mid-Atlantic and Southeast

Academic, operational, and government partners working together to improve meteorology

Home About

Potentially Severe Convection Crossing the Appalachian Mountains Tonight?

Posted on October 26, 2010 by Jonathan Blaes @ WFO RAH

Impressive squall line moving across the Tennessee and Ohio Valleys this afternoon producing lots of severe weather reports. High resolution WRF simulations (shown below) indicate this system may the cross the Appalachian Mountains around midnight. Timing of this system will be problematic and simulations are already slower then radar observations indicate. In very general terms, the NMM appears to be slightly faster and maintains the system more, at least into the very early morning hourse. Local experience has shown that the reflectivity products from the NMM runs are often times stronger then those forecast by the ARW. It will be interesting to see how well this system maintains intself overnight.

This event relates to a recent paper in Weather and Forecasting from a recent CSTAR project.

Forecasting the Maintenance of Mesoscale Convective Systems Crossing the Appalachian Mountains

Casey E. Letkewicz, Matthew D. Parker

Regional Collaboration Meeting

On 28-29 October 2010, over 30 meteorologists from the NWS, faculty and students from NC State University (NCSU), and scientists from RENCI gathered in Raleigh to begin implementation of our 3-year CSTAR project. The meeting objectives were to organize interested collaborative groups for the three primary focus areas of the proposal, which include severe cold-season convection, inland impacts of land-falling tropical cyclones, and improved initial conditions for tropical cyclone prediction. Team leads were identified, and collaborative groups have been organized. As a direct offshoot from the October meeting, the convection group is now holding monthly conference calls, and conference call coordination of the inland TC impacts group has also taken place.

Blogs, Tweets, RSS feeds ...oh my!

Hazardous Weather Testbed Twitter
http://twitter.com/NOAAHWT

CSTAR Blog
http://cimmse.wordpress.com/

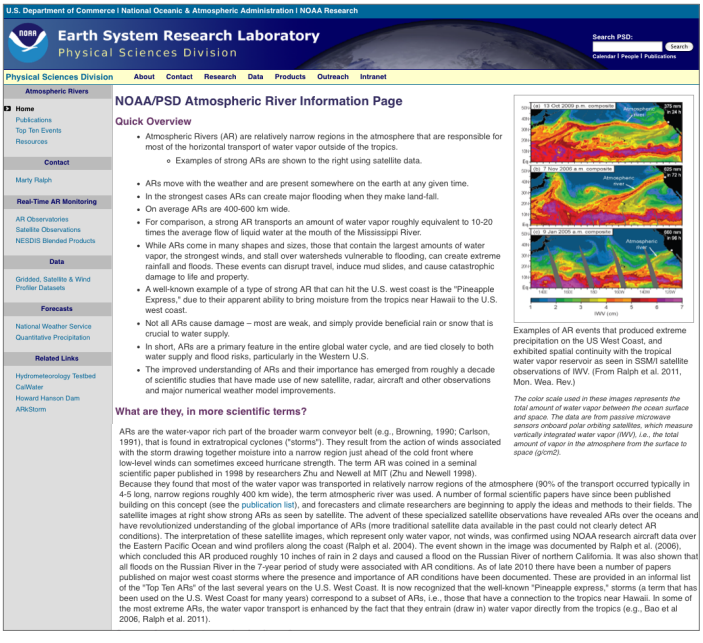
HMT News RSS Feed
http://hmt.noaa.gov/news/rss/feed.xml

HMT-West 2011 Forecast & Ops Blogs
http://hmt.noaa.gov/field_programs/hmt-west/2011/

New Atmospheric River Information Page

http://www.esrl.noaa.gov/psd/atmrivers/

One of the advances fostered by HMT-West has been the observation and analysis of atmospheric rivers and exploration of their potential use in forecasting and decision support services. NOAA/ESRL has led the development of a general-purpose Atmospheric River Information Page to foster communication of scientific findings, emerging applications, a list of peer-reviewed publications, a "top ten" list of atmospheric rivers that have struck the west coast, and related online resources such as briefings used in recent NWS forecaster training sessions.



New Faces

Eugene Mirvis is a software engineer who joined the DTC in early October. He is actually stationed at NOAA EMC and will be the DTC's contact point for NEMS - new modeling framework that NOAA is transitioning to over the coming year.

Mrinal Kanti Biswas is a project scientist who joined DTC on Feb 14. Biswas, from Florida State University, is joining the DTC's Hurricane team. The DTC also has a new software engineer on staff - Tim Brown, who also recently joined the Hurricane Team is affiliated with the DTC node at ESRL/GSD.

HMT welcomes team member, Chengmin Hsu, a hydrologist recently hired by the Earth System Research Laboratory. Hsu first became involved in HMT in the Fall of 2009 as a research assistant where he developed a mathematical method to separate soil moisture data from satellite and thermal sensor observations. The research results became a chapter in his dissertation; an important experience that extended his know-how in remote sensing and GIS toward exploration in land surface and atmosphere processes. Hsu continues to explore methods for mapping high-resolution soil moisture and has been assigned to evaluate the performance of a hydrologic model with various QPF and QPE inputs. He is also involved in a pilot study to create an Enterprise Geographic Information System (eGIS). This system will be used for running various hydrologic models and also serve as the platform in HMT for internal and external data links and system interoperability between NOAA, the US Geological Survey, and the US Army Corps of Engineers.

NOAA named Dr. Steven Koch the new director of the National Severe Storms Laboratory (NSSL). Koch, who earned his doctorate in meteorology in 1979 at the University of Oklahoma, will return to Norman in late April as the new director. Koch will leave his position as director of the Global Systems Division at NOAA's Earth System Research Laboratory in Boulder, Colo., to fill the spot vacated when Jeff Kimpel retired in 2010. Koch will lead a lab with 48 federal and 81 joint institute, post-doctoral and graduate student staff located in the heart of Tornado Alley. The lab focuses on research in weather radar, severe storm forecasts and warnings, and hydrometeorology.

NSSL is co-located with the University of Oklahoma, NOAA's Storm Prediction Center, and the Norman office of the National Weather Service. This arrangement mixes research and operations to better serve the nation in time of severe weather events as well as to enhance our understanding of violent weather.

Results from HMT-HPC Hazardous Weather Testbed 2010 Spring Experiment

Over a five-week period from mid May through mid June 2010, the NOAA Hydrometeorology Testbed at the Hydrometeorological Prediction Center (HMT-HPC) led a quantitative precipitation forecast (QPF) component of the Hazardous Weather Testbed's annual Spring Experiment. The QPF component explored the use of high resolution (1-4 km) convection-allowing deterministic and ensemble model guidance for forecasting precipitation associated with warm-season convection. During the experiment, participants issued daily experimental probabilistic QPFs indicating the potential for exceeding both 0.5" and 1.0" of precipitation during two near-term six-hour periods. Subsequently participants then subjectively evaluated the quality of their forecasts and the quality of the available model guidance relative to the observed precipitation.

The high-resolution models demonstrated skill in warm-season QPF, which portends well for improved QPFs. In particular, the subjective evaluations showed that 65% of the forecasts from the Storm Scale Ensemble Forecast system (SSEF), a 4-km 26-member ensemble provided by the University of Oklahoma's Center for Analysis and Prediction of Storms (CAPS), and 57% of the forecasts from the WRF-NSSL4, a 4-km deterministic model provided by the National Severe Storms Laboratory (NSSL), provided better forecast guidance than their operational counterparts, namely the Short Range Ensemble Forecast System (SREF) and the North American Mesoscale Model (NAM), respectively.

Participating in this experiment enabled HPC forecasters to gain valuable experience

using high-resolution model guidance and to begin determining how best to incorporate this guidance into their forecast process. Work is already underway to expand the QPF component of the 2011 Spring experiment. This work complements similar efforts in HMT-West.

Assessing Current Storm Surge Information from the Public Perspective

Storm surge is defined as an abnormal rise in sea level accompanying a tropical or extratropical cyclone. The National Weather Service (NWS) currently issues a wide array of text and graphical products to communicate the forecasted conditions associated with storm surge. While many people only associate storm surge with tropical cyclones (TC), storm surge also occurs from extratropical cyclones. The Societal Impacts Program (SIP) will assess whether the NWS should develop new storm surge informational approaches to improve the communication and decision-making with respect to extratropical and tropical cyclone storm surge risk. The geographic focus for will cover a sufficient diversity to assess storm surge information needs with respect to extratropical and tropical cyclone related storm surge. Efforts will

focus on (1) exploring and assessing the public's awareness and understanding, or lack thereof, concerning storm surge and currently available storm surge information, regardless of the meteorological cause. (i.e., "Do they know what storm surge is?") and (2) on an initial assessment of whether existing information should be enhanced or provided in new formats (e.g. change from text to graphics) or by new delivery means (e.g., new dissemination medium). FY11 work will focus on implementation of a survey with the public in TC vulnerable areas, a literature review, survey of emergency managers, and development, implementation, and analysis of a shorter survey with the public in TC and TC vulnerable areas

What's a Testbed?

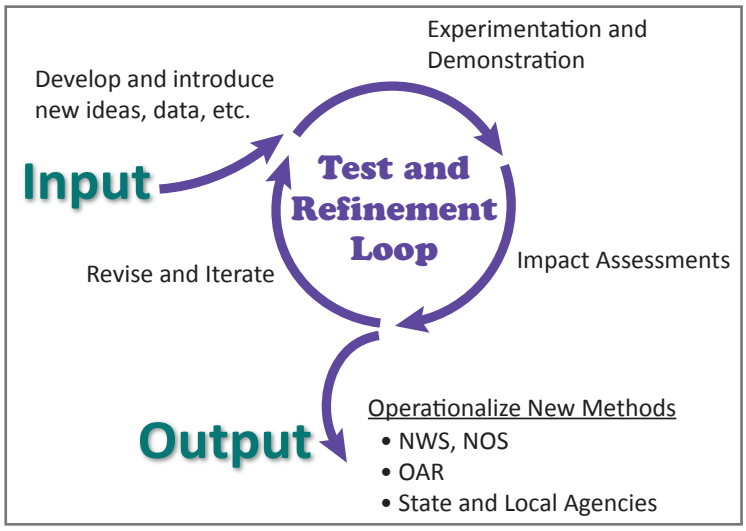
From Merriam Webster's 11th Collegiate Dictionary:

test bed (1917: noun): broadly: any device, facility, or means for testing something in development.

From Dabberdt et al. in BAMS 2005

Test beds defined. The TBWG (testbeds work group) developed the following consensus definition of a test bed. The "blank" in the following paragraph represents a type of phenomenon or forecast problem, for example, air quality, hurricane, hydrometeorology, or severe weather:

A testbed is a working relationship in a quasi-operational framework among measurement specialists, forecasters, researchers, the private sector, and government agencies aimed at solving operational and practical regional _____ problems with a strong connection to the end users. Outcomes from a testbed are more effective observing systems, better use of data in forecasts, improved services, products, and economic/public safety benefits. Testbeds accelerate the translation of R&D findings into better operations, services, and decision-making.



A successful testbed requires physical assets as well as substantial commitments and partnerships.

Dabberdt, Walter F., and Coauthors, 2005: Multifunctional Mesoscale Observing Networks. *Bull. Amer. Meteor. Soc.*, **86**, 961-982, doi:10.1175/BAMS-86-7-961.

Improving NWS Public Forecasts through Integration of Social Science

Weather.gov is the face of the National Weather Service and is accessed millions of times a day. The public forecasts—which include the Forecast-at-a-Glance icons and the 7-day text forecasts—are among the most commonly accessed NWS pages. Despite their popularity, there are deficiencies with the forecast information being provided in that the forecast icons and text products can be inconsistent, misleading, and/or incomplete. This research, conducted by the Societal Impacts Program at NCAR, will improve the communication of expected forecast conditions to better meet users' needs by (1) characterizing the key limitations of the public forecast information currently being provided, and identifying primary areas for improvement; (2) assessing users' interpretations of, uses of, and preferences for the public forecast information, including information currently provided and possibilities for future information; and (3) identifying and implementing changes to the public forecast information resulting from the research. FY11 work will focus on implementation of an initial public / user survey and development, implementation, and analysis of focused surveys with users.

Did you know...

On 30 July 2010 a new national champion was proclaimed by NOAA – a South Dakota hailstone which surpassed all prior contenders in both size and weight! Officially weighing in at a hefty 1 lb, 15 oz. and almost 19 inches in circumference, the stone fell in the yard of Les Scott of Vivian, South Dakota, on 23 July. For the last few years, the U.S. championship has been split between heaviest and largest hailstones. A 1.67-pound behemoth that fell in Coffeyville, Kansas, held the heavyweight title for 40 years, but it gave up the record for size to a stone that fell in Aurora, Nebraska, in 2003.

– Courtesy, UCAR Magazine

Publications Round-Up

Cipullo, M. L., A. Molthan, J. Shafer, J. Case, and G. Jedlovec, 2011: Forecasting Lake-Effect Precipitation in the Great Lakes Region using NASA Enhanced Satellite Data. Proceedings from the 24th Conference on Weather Analysis and Forecasting / 20th Conference on Numerical Weather Prediction, AMS, Seattle.

Darden, C. B., B. Carcione, A. Woodward, and G. T. Stano, 2011: The Utility of Total Lightning for Diagnosing the Severity of Summer Pulse Convection. Proceedings from the Fifth Conference on Meteorological Applications of Lightning, AMS, Seattle.

Guan, B., N. P. Molotch, D. E. Waliser, E. J. Fetzer, and P. J. Neiman, 2010: Extreme Snowfall Events Linked to Atmospheric Rivers and Surface Air Temperature via Satellite Measurements. Geophys. Res. Lett., 37, L20401.

Jedlovec, G. J., M. R. Smith, and K. McGrath, 2011: Challenges in Transitioning Research Data to Operations: The SPoRT Paradigm. Proceedings from the First Conference on Transitions of Research to Operations: Successes, plans, and challenges, AMS, Seattle.

Morss, R. E., and M. H. Hayden, 2010: Storm surge and "certain death": Interviews with Texas coastal residents following Hurricane Ike. Weather, Climate, and Society, 2, 174-189.

Stano, G. T., K. K. Fuell, and G. J. Jedlovec, 2011: NASA SPoRT prepares for the Geostationary Lightning Mapper. Proceedings from the Seventh Symposium on Future NPOESS-JPSS and GOES-R, AMS, Seattle.

Schwartz, C. S., J. S. Kain, S. J. Weiss, M. Xue, D. R. Bright, F. Kong, K. W. Thomas, J. J. Levit, M. C. Coniglio, M. S. Wandishin, 2010: Toward improved convection-allowing ensembles: Model physics sensitivities and optimizing probabilistic guidance with small ensemble membership. Wea. Forecasting, 25, 263-280.

Recent & Upcoming Events

65th Interdepartmental Hurricane Conference
28 February–3 March 2011, Miami, FL
http://www.ofcm.gov/homepage/text/spc_proj/ihc.html

NOAA's 9th Annual Climate Prediction Application Science (CPAS) Workshop
1–4 March 2011, Des Moines, IA
http://www.ucs.iastate.edu/mnet/cpas/home.html

HMT—SPoRT Meeting
8 March 2011, Boulder, CO

The EMC/MMM/DTC Joint WRF for Hurricanes Tutorial
26–29 April 2011, NCAR, Boulder, CO
http://www.regonline.com/Register/Checkin.aspx?EventID=932790

2011 Testbed Workshop
24–26 May 2011, Boulder, CO
http://uswrp.org

WAS*IS (Weather and Society * Integrated Studies) Summer 2011 Workshop
4–12 August 2011, Boulder, CO *(Applications open until March 25, 2011)*
http://www.sip.ucar.edu/wasis/boulder11/apply.php

Testbeds at a Glance

NOAA Testbed Portal
http://www.esrl.noaa.gov/research/uswrp/testbeds/

Climate Testbed (CTB)
http://www.cpc.noaa.gov/products/ctb/

Developmental Testbed Center (DTC)
http://www.dtcenter.org/

Hazardous Weather Testbed (HWT)
http://www.nssl.noaa.gov/projects/hwt/

Hydrometeorology Testbed (HMT)
http://hmt.noaa.gov/

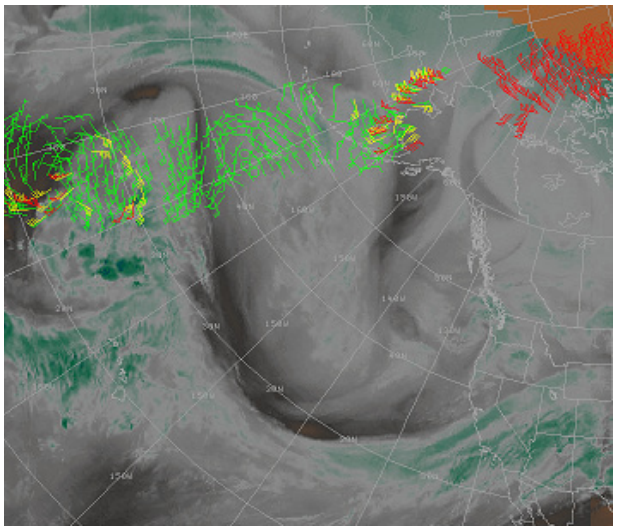
Joint Hurricane Testbed (JHT)
http://www.nhc.noaa.gov/jht/

Societal Impacts Program (SIP)
http://www.sip.ucar.edu/

R2O News

NRL & SPoRT transition WindSat ocean surface wind vectors to NWS

Surface wind observations over the oceans are an important parameter needed by the NWS to provide accurate marine weather forecasts. While the direct measurement of winds from buoys are relatively scarce, ocean surface wind vectors inferred from scatterometrers (ASCAT and SeaWinds) on-board European and NASA QuikSCAT polar orbiting satellite platforms provide global, twice daily, measurements of ocean surface wind vectors under non-precipitating conditions to address various tropical and marine weather forecast issues. The failure of the SeaWinds instrument on the QuikScat satellite in November of 2009 significantly reduced the coverage of wind measurements over the ocean. However, new techniques developed by the Naval Research Lab in Monterey, California have been applied to microwave polarimetric measurements from the DOD WindSat instrument on the Coriolis satellite to produce ocean surface wind vectors. In a collaborative effort with NRL, SPoRT has transitioned these new WindSat ocean surface wind vectors to the National Weather Service for use in their Advanced Weather Information Processing System (AWIPS) – the main visualization and decision support system at all weather service offices.



One of SPoRT's recent transitions involved providing ocean surface wind vectors from the WindSat instrument on the Coriolis satellite to the NOAA Alaska Region weather offices.

NASA SPoRT SST Product

The NASA Short-term Prediction Research and Transition (SPoRT) Center currently produces a high-resolution sea surface temperature (SST) product for use by NWS Weather Forecast Offices as an operational diagnostic and also as input for their weather forecast models. This product uses MODIS data to produce composite SST output with spatial resolution superior to other SST data used to initialize regional weather forecast models.

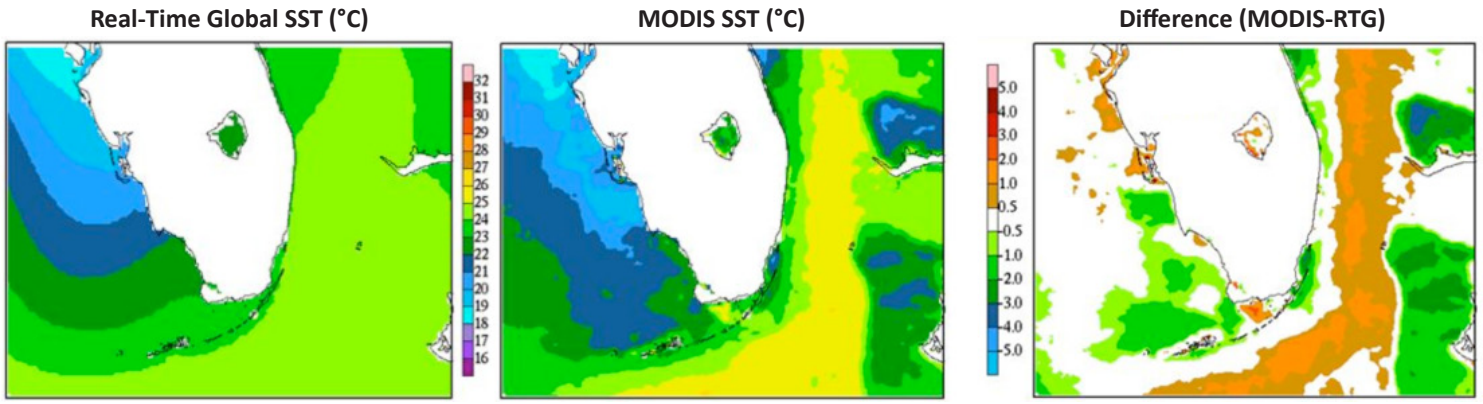


Figure: The operational Real-Time Global SST from 1 March 2007 (left) depicts a relatively smooth field while the SPoRT MODIS product (center) shows exquisite details of the warm Gulf Stream and cooler shelf waters near the Bahamas and the Florida west coast. Differences of 2-3°C are common (right).

NOAA Testbed *news* is a publication from the NOAA USWRP Executive Committee:
Bob Atlas, Don Berchoff, Al Powell, and Marty Ralph (Chair)

Please send meeting notices, news story ideas, and suggestions to the Editor, **Janet.Intrieri@noaa.gov**

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